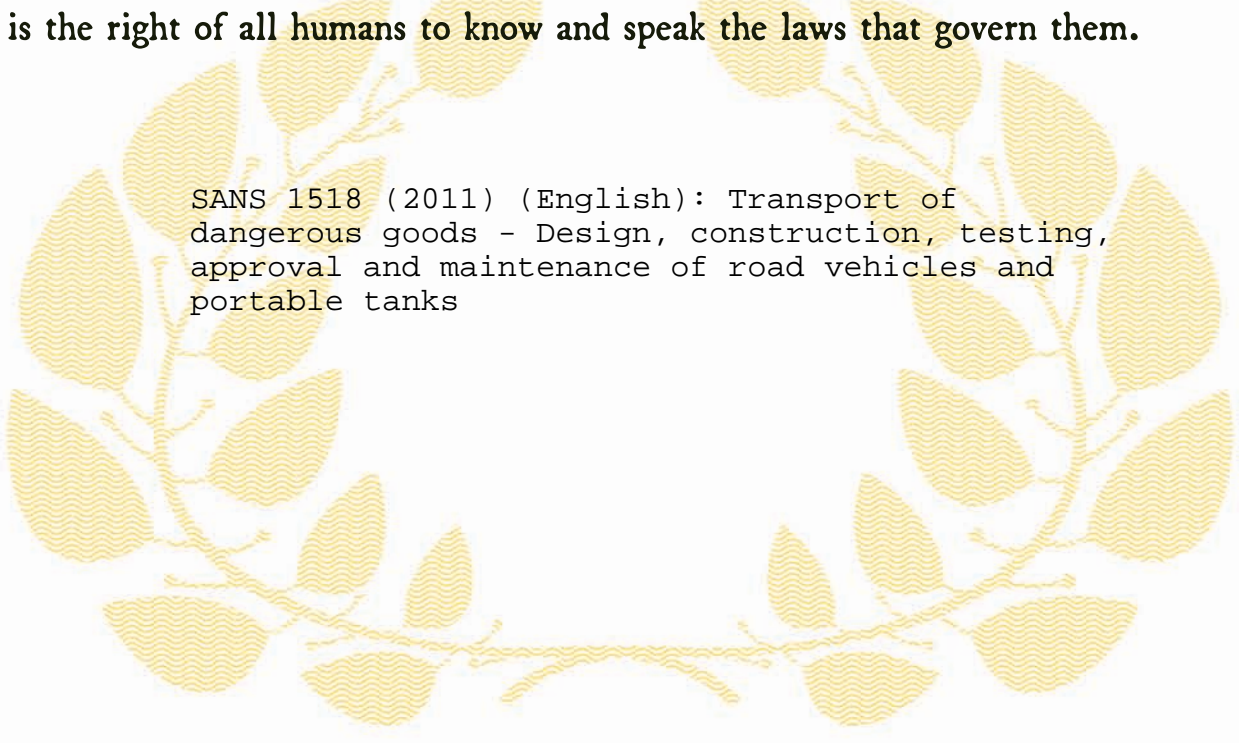




Republic of South Africa

EDICT OF GOVERNMENT

In order to promote public education and public safety, equal justice for all, a better informed citizenry, the rule of law, world trade and world peace, this legal document is hereby made available on a noncommercial basis, as it is the right of all humans to know and speak the laws that govern them.



SANS 1518 (2011) (English): Transport of dangerous goods - Design, construction, testing, approval and maintenance of road vehicles and portable tanks



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SOUTH AFRICAN NATIONAL STANDARD

**Transport of dangerous goods — Design,
construction, testing, approval and
maintenance of road vehicles and portable
tanks**

WARNING:

Can only be read in conjunction with the
*European Agreement concerning the International
Carriage of Dangerous Goods by Road (ADR)*

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Table of changes

Change No.	Date	Scope

Foreword

This South African standard was approved by National Committee SABS SC 1060A, *National committee for dangerous goods standards – Design and construction of vehicles, tanks and accessories for the transport of dangerous goods*, in accordance with procedures of the SABS Standards Division, in compliance with annex 3 of the WTO/TBT agreement.

This document was published in March 2011.

This document supersedes SANS 1518:2008 (edition 3).

This document is referenced in the regulations of the National Road Traffic Act, 1996 (Act No. 93 of 1996).

This standard is based on the latest edition of the European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR) and the application thereof is as follows:

- It complies with the latest edition of the ADR.
- It complies with the ADR requirements for the construction of the vehicle, the tank and the part of the vehicle containing the dangerous goods being transported (excluding packagings). This includes certain items of loose and ancillary equipment necessary for the safe operation of the vehicle and equipment, which might not be directly related to the construction of the vehicle.
- Certain local requirements, which are not covered sufficiently in the ADR, or that are covered in the ADR, but require a modified approach for local application, are contained in annex B of this standard.
- The publication date of this document is not the effective date of any ongoing revisions to the ADR. The effective date for such revisions is determined by the relevant authorities when required and is announced through the relevant legislative means.
- Should any area of conflict exist between this standard and the ADR, the requirements of this standard take precedence.

Reference is made in clause 1, B.1.6.3.(o) and B.1.12.2 to the "relevant national legislation". In South Africa this means the National Road Traffic Act, 1996 (Act No. 93 of 1996), and the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993).

Reference is made in B.1.1.2(a) to the "competent authority". In South Africa this means an approved inspection authority as defined in the Pressure Equipment Regulations of the Occupational Health and Safety Act, which has ADR included in its scope of work.

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Transport of dangerous goods — Design, construction, testing, approval and maintenance of road vehicles and portable tanks

1 Scope

This standard covers requirements for the design, construction, testing, approval and maintenance of road vehicles and portable tanks used to transport dangerous goods as classified in SANS 10228 and as required by the relevant national legislation (see foreword) in quantities in excess of the exempted quantities.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. Information on currently valid national and international standards can be obtained from the SABS Standards Division.

European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)

NOTE The ADR is constantly being updated, and the documents are freely available at www.unece.org

API RP 1004, *Bottom loading and vapour recovery for MC-306 and DOT-406 tank motor vehicles*

ASTM F 1971, *Standard test method for electrical resistance of tires under load on the test bench.*

EN 1361, *Rubber hoses and hose assemblies for aviation fuel handling – Specification.*

EN 12115, *Rubber and thermoplastics, hoses and hoses and hose assemblies for liquid or gaseous chemicals – Specification.*

EN 12434, *Cryogenic vessels – cryogenic flexible hoses.*

EN12252:2005 -A1-2008, *LPG equipment and accessories – Equipping of LPG road tankers*

EN 12493:2008, *LPG equipment and accessories - Welded steel tanks for Liquefied Petroleum Gas (LPG) – Road tankers - Design and manufacture*

EN 12972:2007, *Tanks for the transport of dangerous goods – Testing, inspection and marking of metallic tanks*

EN 13081, *Tanks for transport of dangerous goods – Service equipment for tanks – Vapour collection adaptor and coupler.*

EN 13082:2001, *Tanks for the transport of dangerous goods - Service equipment for tanks – Vapour transfer valve*

EN 13094:2004, *Tanks for the transport of dangerous goods – Metallic tanks with a working pressure not exceeding 0,5 bar - Design and construction*

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EN 13308, *Tanks for transport of dangerous goods – Service equipment for tanks – Non-pressure balanced footvalve.*

EN13314:2002, *Tanks for the transport of dangerous goods - Service equipment for tanks - Fill hole cover*

EN 13316, *Tanks for transporting dangerous goods – Service equipment for tanks – Pressure balanced footvalve.*

EN 13317, *Tanks for transporting dangerous goods – Service equipment for tanks – Manhole cover assembly*

EN 13530-2:2002 -A1-2004, *Cryogenic vessels – Large transportable vacuum insulated vessels – Part 2: Design, fabrication, inspection and testing*

EN 13765, *Thermoplastic multi-layer (non-vulcanized) hoses and hose assemblies for the transfer of hydrocarbons, solvents and chemicals – Specification.*

EN 13766, *Thermoplastic multi-layer (non-vulcanized) hoses and hose assemblies for the transfer of liquid petroleum gas and liquefied natural gas – Specification.*

EN 13922, *Tanks for the transport of dangerous goods – Service equipment for tanks – Overfill prevention systems for liquid fuels*

EN 14025, *Tanks for the transport of dangerous goods – Metallic pressure tanks – Design and construction*

EN 14116, *Tanks for transport of dangerous goods – Digital interface for the product recognition device*

EN14398-2:2003, *Cryogenic vessels – Large transportable non-vacuum insulated vessels – Part 2: Design, fabrication, inspection and testing*

EN14432:2006, *Tanks for the transport of dangerous goods – Tank equipment for the transport of liquid chemicals – Product discharge and air inlet valves*

EN14433:2006, *Tanks for the transport of dangerous goods – Tank equipment for the transport of liquid chemicals – Foot valves*

EN 14595, *Tanks for transport of dangerous goods – Service equipment for tanks – Pressure and Vacuum breathing vent.*

EN 14596, *Tanks for transport of dangerous goods – Service equipment for tanks – Emergency pressure relief valve.*

SANS 1142 (SABS 1142), *Diesel engines modified for use in hazardous situations (other than in mines).*

SANS 1457, *Plastics buttons.*

SANS 1567, *Portable rechargeable fire extinguishers – CO₂ type extinguishers.*

SANS 1910, *Portable refillable fire extinguishers.*

[SANS 10187-8, Load securement on vehicles –Part 8: Dangerous goods.](#)

SANS 10228, The identification and classification of dangerous goods for transport.

WDK 110-3, Ableitwiderstand von Reifen (Luft- und Vollreifen) Gütewerte.

3 Definitions and abbreviations

For the purposes of this document, the following definitions and abbreviations apply.

3.1 All definitions in the ADR.

3.2 Additional definitions for local use:

3.2.1

ADR

European agreement concerning the international carriage of dangerous goods by road

3.2.2

bottom valve

synonymous with foot valve and emergency outlet valve.

NOTE The main valve fitted to the bottom of the compartment controlling the entry and exit of product and complying with the relevant sections of this standard.

3.2.3

coaming vent

vent that vents the vapour recovery collector manifold to atmosphere when the vapour recovery plant is not connected to the vehicle

3.2.4

collector manifold

common manifold into which the vapours from each compartment flow via the compartment vapour vents and are then expelled into the loading installation vapour recovery connection and plant

NOTE Used in vapour recovery systems.

3.2.5

compartment vapour vent

vent that allows for sufficient out- and in-breathing venting capacity during bottom loading and discharge operations to ensure that the tank is not over or under pressurized

NOTE In the case of vehicles fitted with vapour recovery systems, the compartment vapour vent is referred to as a vapour transfer valve

3.2.6

emergency vent

pressure vent fitted to a tank that prevents the tank from rupturing due to a sudden pressure surge when the vehicle is in an accident or due to a high pressure build-up due to abnormal temperature increase such as when the tank is engulfed in a fire

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3.2.7

fibre reinforced plastics

FRP

material complying with the relevant physical properties as required by the standard, but does not include rotomoulded thermoplastics, castmoulded plastics or any other material or construction that is not in compliance with this standard.

NOTE Containers or tanks made of any plastic, fibre or similar material are not permitted for the road transport of dangerous goods unless in full compliance.

3.2.8

junction box

suitable and certified electrical enclosure for making electrical connections therein

3.2.9

rigid tank truck

freight carrier chassis fitted with a fixed, permanently mounted tank or with a body adapted to carry a demountable tank or tank container

3.2.10

trailer

trailer with a fixed tank (including a semi-trailer) or adapted to carry a demountable tank or tank container or packaged goods

3.2.11

truck tractor

vehicle used to draw a semi-trailer or a combination of semi-trailers

3.2.12

ullage

the volumetric space contained between the top of the product level and the roof of the tanker

4 Requirements

The following requirements shall be complied with:

- a) ADR requirements as specified in annex A.
- b) Additional requirements for local use as specified in annex B.

Annex A
(normative)

Applicable ADR requirements

The following sections of the ADR shall, in accordance with table A.1, be complied with:

Table A.1 — Applicable ADR requirements

1	2	3	4
ADR reference			Description
Annex	Part	Clause	
A			General provisions and provisions concerning dangerous substances and articles
A	1		General provisions
A	1	1.1.3.1	Exemptions related to the nature of transport operations
A	1	1.1.3.2	Exemptions related to the carriage of gases
A	1	1.1.3.3	Exemptions related to the carriage of liquid fuels
A	1	1.1.3.4	Exemptions related to special provisions or to dangerous goods packed in limited quantities
A	1	1.2	Definitions and units of measurement
A	2		Classification
A	2	2.1	General provisions
A	2	2.2	Class-specific provisions
A	4		Packaging and tank provisions
A	4	4.2	Use of portable tanks and multiple-element gas containers (MEGCs)
A	4	4.3	Use of fixed tanks (tank vehicles), demountable tanks, tank-containers and tank swap bodies with shells made of metallic materials, and battery-vehicles and multiple-element gas containers (MEGCs)
A	4	4.4	Use of fibre-reinforced plastics (FRP) tanks – fixed tanks (tank vehicles), demountable tanks, tank containers and tank swap bodies
A	4	4.5	Use of vacuum-operated waste tanks
A	6		Requirements for the construction and testing of packagings, Intermediate Bulk Containers (IBC's), large packagings, tanks and bulk containers
A	6	6.7	Requirements for the design, construction, inspection and testing of portable tanks and UN-multiple-element gas containers (MEGCs)
A	6	6.8	Requirements for the construction, equipment, type approval, inspections and tests, and marking of fixed tanks (tank vehicles), demountable tanks and tank containers and tank swap bodies, with shells made of metallic materials and battery vehicles and multiple-element gas containers (MEGCs). The table is repeated in annex B detailing the local adaptations to be applied.
A	6	6.9	Requirements for the design, construction, equipment, type approval, testing and marking of fibre reinforced plastics (FRP), fixed tanks (tank vehicles), demountable tanks and tank containers and tank swap bodies
A	6	6.10	Requirements for the construction, equipment, type approval, inspection and marking of vacuum-operated waste tanks
A	6	6.11	Requirements for the design, construction, inspection and testing of bulk containers
B			Provisions concerning transport equipment and transport operations
B	9		Requirements concerning the construction and approval of vehicles

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Table A. 1 *(concluded)*

1	2	3	4
Annex	Part	Clause	Description
ADR reference			
Annex.	Part	Clause	
B	9	9.2.3	Braking equipment-substitute local South African standard for ECE standard
B	9	9.2.4	Prevention of fire risks
B	9	9.2.5	Speed limitation device
B	9	9.3	Additional requirements concerning complete or completed EX/II or EX/III vehicles intended for the carriage of explosive substances and articles (Class 1) in packages
B	9	9.4	Additional requirements concerning the construction of complete or completed vehicles intended for the carriage of dangerous goods in packages (other than EX/II and EX/III vehicles)
B	9	9.5	Additional requirements concerning the construction of complete or completed vehicles intended for the carriage of dangerous solids in bulk
B	9	9.6	Additional requirements concerning the construction of complete or completed vehicles intended for the carriage of temperature controlled substances
B	9	9.7	Additional requirements concerning fixed tanks (tank vehicles), battery vehicles and complete or completed vehicles used for the carriage of dangerous goods in demountable tanks with a capacity greater than 1 cubic meter or in tank containers, portable tanks or MEGCs of capacity greater than 3 cubic meters (EX/III, FL, OX and AT vehicles)

Annex B
(normative)

Additional requirements for local use

B.1 Requirements for all dangerous goods vehicles

B.1.1 Use of vehicles and tanks not complying with this standard

B.1.1.1 Vehicles and tanks shall only remain in use in accordance with table B.1 below:

Table B.1 — Vehicles and tanks not complying with this standard

1	2	3
Standard of construction of vehicle and tank	Applicable from	Last day of use
Vehicles and tanks of no known construction standard shall be upgraded to at least the equivalent conformity of the earlier SABS 1398:1994 standard of construction within 5 years of publication of this standard and then treated as per tanks constructed before 1 August 2001.		After 5 years of the date of publication of this standard
SABS 1398 or SABS1518-1996 constructed before 1 August 2001		31/12/2015
SABS 1398 or SABS1518-1996 constructed after 1 August 2001	1 August 2001	15 years after date of construction
SANS 1518-2004	1 April 2004	15 years after date of construction
SANS 1518-2008	6 February 2008	15 years after date of construction

B.1.1.2 Notwithstanding the requirements detailed in table B.1, vehicles and tanks may continue to be operated beyond the stated dates in the following cases:

- a) the tank is approved for continued use by the competent authority (see foreword) based on a verification of the design which shall include internal inspections, material thickness verifications, non-destructive tests of tank welded joints, pressure testing of the tank and general compliance with the original design standard;
- b) the approval shall not be a given and shall depend on ongoing safety considerations and suitability of tanks constructed in accordance with superseded standards in meeting the considerations;
- c) such approval is granted for a maximum period of three years. Approval shall be renewable for further 3-year periods pending the application of B.1.1.2(a);
- d) the approval shall not be granted for vehicles and tanks of no known standard of construction.

B.1.1.3 The dates given in table B.1 as the "Last day of use" shall not be regarded as final and binding. Ongoing safety and design considerations and suitability of tanks constructed in accordance with superseded standards in meeting the considerations shall dictate periodic review of the dates.

B.1.1.4 Upgrading of tanks

Tanks may be upgraded from one specification level to another by modification. Such an upgrade shall require the manufacturer to

- a) fully perform all design, inspection and testing functions in terms of all the applicable parameters as contained in annexes A and B of this standard,
- b) issue a new certificate of compliance for the tank as approved by the competent authority,
- c) re-plate the tank in accordance with the new applicable standard, and
- d) ensure that the modified tank then re-start its life in terms of B.1.1.1 from date of modification.

B.1.2 Remounting of tanks

B.1.2.1 Tanks may be remounted from one fixed tank vehicle to a new chassis taking into account the age restrictions detailed in B.1.

B.1.2.2 For such a remounting action to be allowed, the following shall be adhered to:

- a) the compliance certificate for the new vehicle (refer B.1.6) shall indicate that the tank has been remounted;
- b) the original compliance or manufacturer's certificate and the original tank plating shall be available at the time of remounting;
- c) The remount shall be approved by the competent authority based on a verification of the design which shall include internal inspections, material thickness verifications, non-destructive tests of tank welded joints, pressure testing of the tank and general compliance with the original design standard;
- c) The vehicle itself shall comply with the requirements of the construction standard at the time of the remounting; and
- d) when a tank is remounted and undergoes no standard upgrade (see B.1.1.4), the life in accordance with B.1.1.1 starts at the time of the original manufacture.

B.1.3 Classification and dangerous goods list

B.1.3.1 Requirements for the classification and the dangerous goods list shall not be in accordance with the ADR. Classification shall be in accordance with SANS 10228.

B.1.3.2 For a product listed as a dangerous goods substance in SANS 10228, the following requirements as contained in the ADR dangerous goods list shall apply

- a) tank code as contained in column 12,
- b) special provision as contained in column 13, and
- c) vehicle for tank carriage as contained in column 14.

B.1.4 Repair and modifications of vehicles and tanks

NOTE See 1.2.1 in ADR for definition of tank.

B.1.4.1 All vehicles shall be repaired and modified in accordance with the requirements of the original construction standard of the vehicle and tank in all respects.

B.1.4.2 Such repairs and modifications carried out to the tank shall be verified, tested and certified strictly in accordance with the requirements of the original standard of construction of the product containment area.

B.1.4.3 All repairs and modifications to the tank shall be logged and held on record by the operator of the equipment. The records shall contain the following detail:

- a) the name of the organization that affected the repair;
- b) the date of the repair;
- c) a brief description of the work done; and
- d) all relevant test and inspection documentation that proves that the repair or modification was done in accordance with the original design and manufacturing standard.

The records shall be kept for the lifetime of the tank and if the equipment is sold to a future owner, the records shall be carried over to the next owner and continued to be kept by such next owner.

B.1.5 Repair, modification refurbishment and replacement of equipment

B.1.5.1 Any repairs, modification and refurbishment of equipment governed by specific requirements contained in any specific standard (being this standard, by reference or directly, or the original standard of manufacture of the relevant equipment) shall be carried out in such a manner that the equipment complies with the relevant requirements in all respects.

B.1.5.2 Organizations or persons carrying out such work shall ensure that

- a) the work is carried out strictly in accordance with the instructions and requirements of the original manufacturer, and
- b) a certificate of compliance with these requirements is issued upon completion of the work.

B.1.5.3 When existing equipment is replaced with new equipment, any such replacement shall be done using equipment in compliance with the relevant requirements.

B.1.6 Certificate of approval

B.1.6.1 Upon completion of construction of the vehicle, the manufacturer shall issue a certificate of compliance confirming that the vehicle complies with the requirements of this standard.

B.1.6.2 The certificate of compliance shall be approved by the approved inspection authority.

B.1.6.3 The certificate of compliance shall contain at least the following requirements, as applicable:

- a) certificate number;

- b) description of the vehicle;
- a) name of the vehicle manufacturer;
- d) the VIN;
- e) name of the body/tank manufacturer;
- f) body/tank manufacturer's serial number;
- g) vehicle designation in accordance with the ADR;
- h) year of manufacture of the tank/body;
- i) approval number of the tank/body;
- j) tank code in accordance with the ADR;
- k) relevant special provisions;
- m) name and business addresses of the owner and operator;
- n) confirmation of compliance with this standard; and
- o) confirmation of compliance with relevant national legislation (see foreword).

B.1.6.4 The vehicle shall not be registered as a dangerous goods vehicle without the certificate of compliance being presented.

B.1.7 Application of detail design and equipment standards

B.1.7.1 Paragraph 6.8.2.6 (ADR) shall be read without reference to column "(5)" as the table for local use as detailed in B.1.7.2, table B.2 does not have a column "(5)"

B.1.7.2 The following table shall be read in place of the table contained in ADR 6.8.2.6:

Table B.2 — Applicable detail design and equipment standards

1	2	3	4
Applicable sub-sections and paragraphs	Reference	Title of document	Mandatory action for tanks constructed
For all tanks:			
6.8.2.1	EN14025-2008	Tanks for the transport of dangerous goods - Metallic pressure tanks - Design and construction	12 months after publication of this standard
6.8.2.2.1	EN14432-2006	Tanks for the transport of dangerous goods - Tank equipment for the transport of liquid chemicals - Product discharge and air inlet valves	12 months after publication of this standard
6.8.2.2.1	EN14433-2006	Tanks for the transport of dangerous goods - Tank equipment for the transport of liquid chemicals - Foot valves	12 months after publication of this standard
For testing and inspection:			
6.8.2.4 6.8.3.5	EN12972-2007	Tanks for the transport of dangerous goods - Testing, inspection and marking of metallic tanks	12 months after publication of this standard
For tanks with a maximum working pressure not exceeding 50 kPa and intended for the carriage of substances for which a letter "G" is given in column (12) of Table A of chapter 3.2 of the ADR.			
6.8.2.1	EN13094-2004 ^a	Tanks for the transport of dangerous goods - Metallic tanks with a working pressure not exceeding 0,5 bar - Design and construction	12 months after publication of this standard
For tanks for gases of Class 2			
1.2.1, 6.8.1, 6.8.2.1 (with the exception of 6.8.2.1.17, 6.8.2.5, 6.8.3.1, 6.8.3.5, 6.8.5.1 to 6.8.5.3)	EN12493-2008 (except annexure C)	LPG equipment and accessories - Welded steel tanks for Liquefied Petroleum Gas (LPG) - Road tankers - Design and manufacture <i>Note: Road tankers to be understood in the meaning of "fixed tanks and demountable tanks" as in accordance with ADR</i>	12 months after publication of this standard
6.8.3.2 (with the exception of 6.8.3.2.3 and 6.8.3.4.9)	EN12252-2005 -A1-2008	LPG equipment and accessories - Equipping of LPG road tankers <i>Note: Road tankers to be understood in the meaning of "fixed tanks" and "demountable tanks" in accordance with ADR</i>	12 months after publication of this standard
6.8.2.1 (with the exception of 6.8.2.1.17), 6.8.2.4, 6.8.3.1 and 6.8.3.4	EN13530-2-2002 -A1-2004	Cryogenic vessels - Large transportable vacuum insulated vessels - Part 2: Design, fabrication, inspection and testing	12 months after publication of this standard
6.8.2.1 (with the exception of 6.8.2.1.17, 6.8.2.1.19 and 6.8.2.1.20), 6.8.2.4, 6.8.3.1 and 6.8.3.4	EN14398-2-2003 (except Table 1)	Cryogenic vessels - Large transportable non-vacuum insulated vessels - Part 2: Design, fabrication, inspection and testing	12 months after publication of this standard
For tanks intended for the carriage of liquid petroleum products and other dangerous substances of Class 3 which have a vapour pressure not exceeding 110 kPa at 50 °C and petrol and which have no toxic or corrosive subsidiary hazard			
6.8.2.1	EN13094-2004 ^a	Tanks for the transport of dangerous goods - Metallic tanks with a working pressure not exceeding 0,5 bar - Design and construction	12 months after publication of this standard
6.8.2.2 and 6.8.2.4.1	EN13082-2001	Tanks for the transport of dangerous goods - Service equipment for tanks - Vapour transfer valve	From publication of this standard

Table B.2 (*concluded*)

1	2	3	4
Applicable sub-sections and paragraphs	Reference	Title of document	Mandatory action for tanks constructed
For all tanks:			
6.8.2.2 and 6.8.2.4.1	EN13314-2002	Tanks for the transport of dangerous goods - Service equipment for tanks - Fill hole cover	From publication of this standard
6.8.2.2 and 6.8.2.4.1	EN13316-2002	Tanks for the transport of dangerous goods - Service equipment for tanks - Pressure balanced foot valve	From publication of this standard
6.8.2.2 and 6.8.2.4.1	EN13317-2002 (except for the figure and Table B.2 in annex B) (The material shall meet the requirements of EN13094-2004 clause 5.2)	Tanks for the transport of dangerous goods - Service equipment for tanks - Manhole cover assembly	From publication of this standard
6.8.2.2 and 6.8.2.4.1	EN13317-2002 -A1-2006	Tanks for the transport of dangerous goods - Service equipment for tanks - Manhole cover assembly	01/01/2011
6.8.2.2 and 6.8.2.4.1	EN14595-2005	Tanks for the transport of dangerous goods - Service equipment for tanks – Pressure and vacuum breathing vent	From publication of this standard

^a This is the 2004 edition of EN 13094 and not the latest edition.

B.1.7.3 (see ADR 6.8.2.7)

For local use, this paragraph (ADR 6.8.2.7) to be read as follows:

To reflect scientific or technical progress or where no standard is listed in B.1.6.2, or to address specific aspects not addressed in B.1.7.2, the competent authority may recognize the use of a technical code providing the same level of safety. The tank shall however comply with the minimum requirements of ADR 6.8.2.

B.1.8 Fire extinguishers

B.1.8.1 Vehicles shall be fitted with the following portable, dry powder type fire extinguishers (or an equivalent capacity of any other suitable extinguishing agent) suitable for inflammability classes A, B and C:

- a) truck tractors – 1 x 9 kg minimum external fire extinguisher;
- b) freight carriers (with fixed or demountable tanks or for packaged goods), – 2 x 9 kg minimum external fire extinguishers;
- c) trailers – 2 x 9 kg minimum external fire extinguishers;
- d) light motor vehicle (less than 3500 kg GVM) - 2 x 4.5 kg or 1 x 9 kg.

B.1.8.2 All fire extinguishers shall be mounted in easily accessible, quick-release holders, in an area where they are protected against negative environmental and operational influences such as corrosive products. Horizontal or vertical mounting shall be avoided to prevent compaction of the powder-extinguishing agent.

B.1.8.3 All fire extinguishers shall be provided with

- a) a seal verifying that the extinguisher has not been used,
- b) a gauge or indicator that clearly indicates whether the extinguisher is ready for use at the required operating charge pressure,
- c) a label showing last test date, period of validity and next test date. The label shall be applied in a position where it shall remain legible for the entire validity period, and
- d) a mark indicating compliance with SANS 1910 for powder type extinguishers and SANS 1567 for CO₂ extinguishers

B.1.8.4 The fire extinguishers shall be maintained, tested and labeled periodically in accordance with SANS 1457.

B.1.9 Cargo containment for packaged goods vehicles

B.1.9.1 The cargo containment area of the vehicle shall be suitably equipped for the transportation, stowage and containment of the type of packaged goods to be transported. Body sides at the rear and both sides of the vehicle shall be at least 600 mm high, or the stowage area for dangerous goods shall be in compliance with SANS 10187-8.

NOTE Body sides are only required if transporting gas cylinders or unsecured dangerous goods.

B.1.9.2 The cab shall be separated from the cargo containment area by an effective bulkhead. A factory-fitted rear windscreen may be used in the rear bulkhead of an LDV cab, but shall not be of the sliding type.

B.1.9.3 Such cargo containment areas shall not be provided with any seating for passengers.

B.1.10 Cigarette lighter sockets

B.1.10.1 Vehicles shall not be equipped with cigarette lighters.

B.1.10.2 If auxiliary electrical sockets are required inside the cab, these shall be provided with effective blanking caps.

B.1.11 Wheel chocks (not applicable to vehicles of GVM of 3500 kg or less)

Each vehicle in a combination shall be provided with two wheel chocks of sufficient strength and made from non-sparking material. Wheel chocks are not required to be fitted to a truck tractor.

B.1.12 Mudguards and spray suppression (not applicable to vehicles of GVM of 3500 kg or less)

B.1.12.1 All wheel positions on the vehicle or combination of vehicles shall be fitted with effective mudguards covering at least the full width of the tyres on the wheel position.

B.1.12.2 All wheel positions shall be fitted with effective spray suppression flaps or devices. At least one spray suppression flap or device shall be used per wheel position. A spray suppression flap may be applied as a mudflap/stone guard as required by the relevant national legislation (see foreword) for all heavy vehicles.

B.1.13 Side under-run protection (not applicable to vehicles of GVM of 3500 kg or less)

B.1.13.1 All vehicles shall be equipped with efficient side under-run protection devices along unprotected areas of the sides of the vehicle to prevent pedestrians and cyclists from ending up underneath the moving dangerous goods vehicle.

B.1.13.2 The bottom edge of the lower rail shall be approximately 400 mm from the ground and the gap to the top rail shall not exceed 300 mm.

B.1.13.3 The outer surface of the side under-run protection rails shall not be further than 50 mm from the outer edge of the tyres.

B.1.13.4 The unprotected areas at the front and rear of the rails shall not exceed 250 mm.

B.1.13.5 Where equipment has been fitted in such areas and is deemed to fulfill the intended function of the side under-run rails, no additional side under-run protection needs to be fitted over and above such equipment.

B.1.13.6 Single rail side under-run devices may be used where the design of the vehicle makes it impractical to fit a dual rail installation.

B.1.14 Hoses

B.1.14.1 Hoses shall be compatible with the products being transported in all respects.

B.1.14.2 Hoses shall comply with the following standards:

1	2
Type of hose	Applicable standard
Thermoplastic Multilayer ("Composite") hoses for hydrocarbons, solvents and chemicals	EN 13765
Rubber hoses for liquid and gaseous chemicals	EN 12115
Aviation fuel hoses	EN 1361
LPG hoses	EN 13766
Cryogenic flexible hoses	EN 12434

B.1.14.3 Hoses shall have working pressure ratings of at least 1,5 times the maximum pressure being experienced during the normal use of the hose.

B.1.14.4 Hoses (not hose installations designed as wet hoses), related couplers and stowage areas, shall be self-draining into areas where drainage of spilt product cannot cause any safety hazard.

B.2 Requirements for vehicles transporting class 3 dangerous goods

B.2.1 Engine shielding

As far as practical, a fire- and spill-protection shield, made of metal or other suitable non-absorbent material, shall be fitted at the rear of the cab to

- a) protect the cargo from a fire in the engine compartment, and
- b) prevent product spillage from entering the engine compartment.

B.2.2 Exhaust system protection

B.2.2.1 Where the thermal shield (see ADR) does not afford the required protection, additional shields shall be fitted to prevent any product spillage from making contact with any hot part of the exhaust system. The shielding shall be designed and fitted in such a manner that the surface temperature remains lower than 200 °C.

B.2.2.2 Where un-shielded sections of the exhaust system have surface temperatures that remain below 200 °C, no additional shielding is required.

B.2.2.3 A vertical exhaust may be used provided that there is effective shielding and an effective method of preventing ingress of flammable liquid is used.

B.2.3 Cab

If a hatch is fitted to the roof of the cab, it shall be constructed such as to prevent the ingress of any product spillage through this aperture when the hatch is in the closed position.

B.2.4 Electrical

B.2.4.1 Fuses and circuit breakers for unprotected (permanently live) circuits shall be fitted in a suitable enclosure and rated for the smallest conductor being protected, marked with the maximum fuse/circuit breaker rating. Such fuses and circuit breakers shall open-circuit within 10 s and 30 s respectively when a current of twice the relevant rating is passed.

B.2.4.2 Electrical installations to the rear of the cab shall comply with the following requirements:

- a) electrical junction boxes and other equipment shall not be installed in positions where there is a risk of product spillage onto such equipment from leaking valves, pipelines and product handling activities, such as loading and discharge,
- b) all connections shall be made in secure junction boxes using fixed terminals or in moulded conduit branches,
- c) cable entry into the junction boxes shall be by means of suitable glands,
- d) electrical connections shall not make use of open contacts, connections by means of piercing contacts and push-in connections, unless the latter are fitted with a durable mechanical latch,
- e) wiring, fittings and equipment used shall be suitable for the operating environment and resistant to degradation by contact with the products transported, and

- f) electrical equipment installed adjacent to equipment and areas that might vent to the atmosphere, including the bottom loading and vapour recovery adaptors, shall comply with the requirements in table B.3. This does not include permanently energized equipment.

Table B.3 — Distances from source of vapour/liquid release to electrical equipment

1	2
Distance from source of vapour/liquid release	Equipment requirement
Less than 500 mm	Suitable for Zone 2 operation
From 500 mm to 1000 mm	IP 65
Greater than 1000 mm	No restriction

B.2.4.3 Where jump-start sockets are fitted, these shall be connected to the switched side of the battery master switch and shall either be installed inside the battery enclosure or in a separate enclosure.

B.2.5 Front charge line

All truck tractors and freight carrier chassis shall be fitted with a suitable brake coupler at the front of the vehicle. The coupler shall be used in an emergency to charge the vehicle air system should the vehicle operating system run out of air, or to move a broken-down or immobile vehicle away from a hazardous situation.

B.2.6 Tyre conductivity

In order to dissipate static electricity effectively, all tyres used shall meet the requirements of ASTM F1971.

WDK 110-3 may be used as an alternative requirement.

B.2.7 Electrical continuity

B.2.7.1 Metal-to-metal connections shall have a continuity of less than 10 ohms.

B.2.7.2 Non-metallic conductive components shall be installed such that that electrical continuity with the adjacent component is less than 10^6 ohms.

B.2.7.3 Tanks shall be mounted such that the electrical conductivity between the tank and the wheels does not exceed 10 ohms and between the tank and the road surface does not exceed 10^6 ohms.

B.2.8 Overfill protection

B.2.8.1 All vehicles constructed to be bottom loaded with liquid products in bulk shall be fitted with an effective overfill prevention system, which shall terminate loading when an overfill situation is reached, by either shutting the bottom valves on the vehicle and the loading facility or both.

B.2.8.2 The overfill prevention system shall be installed such that product spillage is prevented, taking into account the flow rates of the loading facility and the reaction time of the various system elements. In no case shall an overfill system “trigger” when the remaining ullage in the compartment being loaded is:

- a) less than 200 litres for a vehicle fitted with pneumatic sensors.
- b) less than 150 litres for a vehicle fitted with electronic sensors.

B.2.8.3 The trigger level shall be measured between the product level and the inlet to the compartment vapour vent.

B.2.8.4 Each individual compartment shall be fitted with a separate overfill sensor.

B.2.8.5 The overfill system shall be configured such that when any one sensor senses an overfill condition, the complete bottom loading action for the vehicle is terminated. No further loading shall be allowed until the overfill condition has been rectified in the relevant compartments.

B.2.8.6 Where overfill sensors are of an adjustable type, means shall be provided to seal the adjustment mechanism with a seal that shall indicate tampering after initial adjustment.

NOTE An example of a typical seal used is a “meter” seal.

B.2.8.7 Overfill protection systems shall not be fitted with over-ride mechanisms (which can be used to de-activate the system whilst loading the vehicle).

B.2.8.8 Where overfill protection systems are fitted with a standard open (electrical contact open when air pressure is not applied) pressure switch which serves to provide the electrical signal that an overfill sensor has triggered, the pressure setting of the switch shall be such that the switching to the open position occurs at 110 % of the minimum pneumatic control system operating pressure on the vehicle.

B.2.8.9 Electronic overfill systems

B.2.8.9.1. Electronic overfill prevention systems shall comply with EN 13922.

B.2.8.9.2 Where an electronic overfill sensor has been fitted together with a pneumatic sensor to a tank compartment, the electronic sensor shall be set to trigger at an approximate 20 mm height before the pneumatic sensor triggers.

B.2.9 Emergency venting

B.2.9.1 Each compartment of a tank shall be fitted with an emergency vent in accordance with EN 14596 to relieve internal pressure surges, which might cause the tank to rupture in the case of an accident, and to relieve internal pressure build-up due to excessive product temperature in the case of a fire.

B.2.9.2 The vent may be fitted as part of the manhole cover or it may be fitted directly to the top of the compartment shell.

B.2.10 Pipelines and bottom loading adaptors

B.2.10.1 Pipelines shall be sized to ensure that product flow speeds do not exceed 7 m/s at any time, during either loading or discharge operations.

B.2.10.2 Installed pipeline systems complete with equipment in place shall be able to withstand operating, test and surge pressures that are at least equal to those specified for bottom valves in accordance with EN 13316 or EN 13308, as applicable. In no case shall the design pressure be less than 500 kPa, the test pressure 1,5 times the design pressure, and the surge pressure 5 times the design pressure.

B.2.10.3 On vehicles fitted with pressure balanced bottom valves that can close against the product flow whilst being bottom loaded, loading adaptors shall be able to withstand surge pressures of up to 2500 kPa.

B.2.10.4 "API" type bottom-loading adaptors shall comply with EN 13308.

B.2.11 Spill containment

B.2.11.1 Tanks shall be provided with an effective spill containment area enclosing all equipment mounted on the tank top from which product can spill during either loading operations or transport.

B.2.11.2 The spill containment area shall be so designed and constructed to fully contain any spillage and be seal-welded or otherwise attached to the tank top so that any spillage is directed to the ground via the provided spillage drains only.

B.2.11.3 Adequate spillage drains, compatible with the product transported, shall be provided to drain any spillage occurring into the spill containment area to the ground into areas where the drained product cannot cause any safety hazard and away from any road tanker equipment such as pumps, meters, brakes and electrical equipment.

B.2.12 Permanently enclosed areas of entrapment

B.2.12.1 All areas that are permanently enclosed, such as hollow-section overturn protection members welded to the tank, and in which product or vapour can become entrapped through spillage and leakage from within the tank, shall be provided with sufficiently sized degassing ports. These degassing ports shall be plugged by means of screw plugs.

B.2.12.2 Internal structures, such as cleaning rings and double bulkheads between compartments, forming a void inside the tanker, shall be provided with a vent at the highest point permanently open to atmosphere, and a drain at the lowest point. It is not recommended to fit an isolating valve to the drain. The ports for the vent and drain shall be sufficiently sized to allow for degassing.

B.2.13 Vapour recovery systems

B.2.13.1 Where vapour recovery systems are fitted, these systems shall be in accordance with API RP 1004 with regards to the following:

- a) collector manifolds and down pipes shall be of a cross sectional area at least equal to that of a pipe with inside diameter 100 mm;
- b) each individual compartment vapour transfer valve shall be connected in series to the respective compartment bottom valve (the compartment vapour vent will be open before the compartment bottom valve opens);
- c) The vapour transfer valve shall comply with EN 13082

d) the coaming vent shall be of a normally open type and shall close to the atmosphere upon coupling of the vapour recover coupler from the loading installation. It shall operate on a fail-safe principle and shall incorporate a pressure and vacuum venting function should the pressure inside the collector manifold exceed 23 kPa or the vacuum exceed 5 kPa.

e) The maximum back pressure of the entire vapour recovery system shall not exceed 5.5 kPa

B.2.13.2 The vapour recovery adaptor shall be in a location suitable to local operations and may fall outside the requirements of the recommended API standard.

B.2.13.3 The vapour recovery adaptor shall comply with EN 13081.

B.2.14 Vapour venting

B.2.14.1 Each compartment shall be provided with sufficient pressure and vacuum venting capacity by means of the compartment vapour vent, to ensure that the tank is not over- or under-pressurized during both bottom loading and discharge operations.

B.2.14.2 Such venting capacity shall be over and above the standard pressure/vacuum breathing vent required in terms of table 6.8.2.6 of the ADR. Such vents shall comply with EN 14595.

B.2.15 Bottom valve installations

B.2.15.1 Bottom valves shall be fastened to the companion flange in the tank floor or sump by means of studs fitted into blind and tapped holes, or bolts fitted from the inside of the sump flange and seal-welded to the flange on the inside of the tank.

B.2.15.2 Where the bottom valve does not provide effective means of spray deflection, such as in the case of a remotely mounted bottom valve and product entering a compartment via an external trough, the entry port shall be provided with an internal deflection plate. This plate shall effectively minimize jetting or spraying of product, with the consequential risk of the generation of static electricity and spillage from an open manhole cover.

B.2.16 Internal compartment bonding

B.2.16.1 In order to dissipate static electrical charges that develop during loading, each compartment of a tank shall be fitted with a static electricity central conductor with an electrical connectivity with the tank shell of less than 10 ohms. This may be a cable, chain or fixed rod, connected between the tank roof and tank floor.

B.2.16.2 Each protruding fixture into the compartment, such as ullage markers, overfill sensors or dipstick guides, that could act as dissipating points for static electricity to discharge to from the product surface shall be electrically bonded to this central conductor.

B.2.17 Ground clearance of equipment

Any equipment fitted that may contain product or product vapours, or that is used to house or attach such product- or vapour-containing equipment, shall have sufficient ground clearance, taking into account the location of the equipment on the vehicle and the potential hazards associated with such locations. Under no circumstances shall this ground clearance be less than 300 mm.

B.2.18 Emergency release

B.2.18.1 The bottom valve control system shall be fitted with an emergency release mechanism which, when activated, shuts down the complete bottom valve control system and all the compartment bottom valves simultaneously.

B.2.18.2 Such a mechanism shall be located away from the area of standard operation, such as the bottom valve, loading and discharge control panel, as these areas are regarded as the most hazardous during the loading and discharge operation.

B.2.19 Tank-top access

B.2.19.1 Where tank-top access is required, it shall be done by means of a sturdy and safe access ladder, provided with handholds at the top to allow the operator to easily and safely access the tank top.

B.2.19.2 Fixed tank-top access ladders shall be fitted against the tank at an angle of 90° max, measured between the vertical ladder and the ground. The angle shall be measured in the space between the ladder and the tank.

B.2.19.3 Ladder rungs shall be of a non-skid design. The minimum clearance between the inboard edge of any rung and the tank and any fixture immediately inboard of it shall be 150 mm.

B.2.19.4 The tank-top walkway area shall be free from obstructions and care shall be taken to minimize stumbling hazards. The walking area shall incorporate non-skid features.

B.2.20 Product recognition systems

All product recognition (cross-over prevention) systems fitted shall comply with EN 14116.

B.2.21 Pneumatic control system air supply

B.2.21.1 Air supply to the pneumatic control system (or any other product-related operating system), shall be such that the main vehicle air system is fully protected and remains intact should a failure occur in any of the control system air lines or at the point from which the air is drawn from the main air system.

B.2.21.2 Operating system air capacity shall be provided through the installation of auxiliary air reservoirs of sufficient capacity to allow for all loading and off-loading operations to take place without having to recharge the air during the operation.

B.2.22 Drive-away prevention

B.2.22.1 Vehicles being loaded or discharged in bulk, shall be equipped with drive-away prevention mechanisms (interlocks) to prevent the vehicle from being loaded or discharged when the park brake has not been applied.

B.1.22.2 Any such mechanism shall be installed in such a way that it will not apply the park brake, but that application of the park brake will allow for effective operation of the mechanism.

B.2.23 Pumping systems

B.2.23.1 One of the following drive systems for product pumps shall be used:

- a) the engine of the vehicle;
- b) an air or hydraulic motor;
- c) a flameproof electric motor; or
- d) an auxiliary compression ignition engine.

B.2.23.2 A spark-ignition engine shall not be used.

B.2.23.3 An auxiliary compression ignition engine shall comply with the following requirements:

- a) The drive engine shall comply with SANS 1142. The intake shall be fitted with the applicable flame-arrestor.
- b) The drive engine shall be installed away from the loading and discharge areas. It shall be located and screened such that flammable vapours are not drawn to the engine and that any product spillage shall not come into contact with the engine or exhaust system. The location shall be well ventilated and shall not pose any risk of overheating the engine.
- c) Any electrical system related to the drive engine shall be suitable for the area of operation (zone 1).
- d) The controls shall be clearly marked and located as far from the loading and discharge points and the pump as possible.
- e) The engine shall be provided with a clearly identified, easily accessible emergency stop control in the discharge area of the vehicle. This mechanism shall be suitable for the area of operation.

B.2.23.4 The operating speed shall be so controlled that the maximum rating of the pump cannot be exceeded.

B.2.23.5 The type of pump used shall be compatible with the product passing through it and the body shall be made from a non-porous, non-flammable material.

B.2.24 Tank plating

B.2.24.1 All tanked vehicles shall be fitted with clear, durable plates in the immediate proximity of the loading points, showing the maximum load allowed in litres for each product that may be loaded into each compartment.

B.2.24.2 In the case where a range of products can be loaded, only the products of highest and lowest densities may be indicated on the plates.

B.2.24.3 Metal plates, permanently marked and securely attached to the tank or tank support structure shall indicate the following:

- a) The maximum number of compartments that may be loaded simultaneously (i.e., maximum number of loading arms that may be coupled simultaneously). This is especially important for tanks fitted with vapour recovery systems and a separate loading point for each compartment as it has a bearing on the required venting capacity.

- b) For tanks fitted with a separate loading point per compartment, a compartment identification plate per loading point.
- c) For tanks fitted with branched one-to-multiple manifolds and a manually operated isolating valve per compartment line, a compartment identification plate per isolating valve.
- d) A description of the type of overfill sensors fitted to the vehicle.
- e) Overfill sensor setting dimensions measured from the overfill sensor reference dimension.

B.2.24.4 Plates may be combined into one. Compartment loading plates and compartment identification plates (for loading points and isolating valves) shall remain separate.

B.2.25 Labelling and signage

The following equipment shall be clearly labelled with regards to their function and operating positions:

- a) earth lugs and bonding reels;
- b) emergency release;
- c) battery isolator activation devices;
- d) jump start socket (where fitted); and
- e) product pump drive operation.

B.3 Requirements for vehicles transporting class 2 dangerous goods

B.3.1 Paragraph 6.8.3.6 (ADR) shall be read without reference to column "(5)" as the table for local use as detailed in B.3.2, table B.4 does not have a column "(5)"

B.3.2 The following table shall be read in place of the table contained in ADR 6.8.3.6:

**Table B.4 — Applicable detail design standards
for vehicles transporting class 2 dangerous goods**

1	2	3	4
Applicable sub-sections and paragraphs	Reference	Title of document	Mandatory action for tanks constructed
(1)	(2)	(3)	(4)
For all tanks:			
6.8.3.1.4 and 6.8.3.1.5 6.3.8.2.18 to 26 6.3.8.4.10 to 12 6.3.8.5.10 to 13	EN 13807-2003	Transportable gas cylinders - Battery vehicles - Design, manufacture, identification and testing	12 months after publication of standard

B.3.3 (With reference to ADR 6.8.3.7)

For local use, this paragraph shall be read as follows:

Battery vehicles and MEGC's which are not designed, constructed and tested in accordance with standards as set out in B.3.2, shall be designed, constructed and tested in accordance with the requirements of a technical code recognized by the competent authority. They shall however comply with the minimum requirements of B.3.2.

B.4 Requirements for vehicles transporting class 6 dangerous goods

Road tankers of ADR tank code L10BH may be used to transport cyanide (UN 1935) instead of ADR tank code L10CH, subject to the piping being protected from impact by a structural cage and that the weakest point of the piping shall be downstream of the main shutoff valve.

Bibliography

SANS 1055, *Rear underrun protection devices*.

SANS 10187-1, *Load securement on vehicles – Part 1: General requirements*.

SANS 10231, *Transport of dangerous goods – Operational requirements for road vehicles*.

SANS 10232-1, *Transport of dangerous goods – Emergency information systems – Part 1: Emergency information system for road transport*.

SANS 10233, *Transport of dangerous goods – Intermediate bulk containers for road and rail transport*.

SANS 20013/ECE R13, *Uniform provisions concerning the approval of vehicles of categories M, N and O with regard to braking*.

SANS 60079-0/IEC 60079-0, *Explosive atmospheres – Part 0: Equipment – General requirements*.

SANS 60079-1/IEC 60079-1, *Explosive atmospheres – Part 1: Equipment protection by flameproof enclosures "d"*.

SANS 60079-2/IEC 60079-2, *Explosive atmospheres – Part 2: Equipment protection by pressurized enclosures "p"*.

SANS 60079-5/IEC 60079-5, *Explosive atmospheres – Part 5: Equipment protection by powder filling "q"*.

SANS 60079-6/IEC 60079-6, *Explosive atmospheres – Part 6: Equipment protection by oil-immersion "o"*.

SANS 60079-7/IEC 60079-7, *Explosive atmospheres – Part 7: Equipment protection by increased safety "e"*.

SANS 60079-11/IEC 60079-11, *Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"*.

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SANS 60079-14/IEC 60079-14, *Explosive atmospheres – Part 14: Electrical installations, design, selection and erection.*

SANS 60079-15/IEC 60079-15, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n".*

SANS 60079-18/IEC 60079-18, *Explosive atmospheres – Part 18: Equipment protection by encapsulation 'm'.*

SANS 60529/IEC 60529, *Degrees of protection provided by enclosures (IP Code).*

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